

SHORT RANGE MODEL FOR BWS

Paul Ruscher

**Florida State University
Department of Meteorology
Tallahassee, FL 32306-4520**

August 2002

Final Report

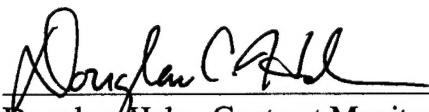
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

20020910 009



**AIR FORCE RESEARCH LABORATORY
Space Vehicles Directorate
29 Randolph Road
AIR FORCE MATERIEL COMMAND
HANSCOM AIR FORCE BASE, MA 01731-3010**

"This technical report has been reviewed and is approved for publication"



Douglass Hahn, Contract Monitor



Robert Beland, Branch Chief

This report has been reviewed by the ESC Public Affairs Office (PA) and is releasable to the National Technical Information Service (NTIS).

Qualified requestors may obtain additional copies from the Defense Technical Information Center (DTIC). All others should apply to the National Technical Information Service (NTIS).

If your address has changed, if you wish to be removed from the mailing list, or if the addressee is no longer employed by your organization, please notify AFRL/VSIM, 29 Randolph Road, Hanscom AFB MA 01731-3010. This will assist us in maintaining a current mailing list.

Do not return copies of this report unless contractual obligations or notices on a specific document require that it be returned.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</p>			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED	FINAL REPORT (SUMMARY)
15 August 2002		5. FUNDING NUMBERS	
4. TITLE AND SUBTITLE Short Range Model for BWS		PE: 63707F PR: 2688 TA: GT WU: MC Contract #: F19628-93-K-0006	
6. AUTHOR(S) Paul Ruscher		8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Florida State University Department of Meteorology Tallahassee, FL 32306-4520		10. SPONSORING/MONITORING AGENCY REPORT NUMBER AFRL-VS-TR-2002-1605	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Air Force Research Laboratory 29 Randolph Road Hanscom AFB MA 01731-3010		11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited.		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The 1D PBL model has been substantially improved to incorporate vertical motion from GEMPAK grid files, so that vertical advection (subsidence) realistically affects PBL growth. The stable growth has been refined to ensure correct matching under PBL transitions from one regime to another.			
14. SUBJECT TERMS PBL Temperature GEMPAK			15. NUMBER OF PAGES
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT SAR

The following summary condenses the bulk of the work performed under contract number F19628-93-K-0006 by Paul Ruscher and graduate students at the Florida State University. This constitutes the final submission under the contract.

Summary Findings and Conclusions

- The 1D PBL model has been substantially improved to incorporate vertical motion from GEMPAK grid files, so that vertical advection (subsidence) realistically affects PBL growth.
- The very stable PBL has been refined to ensure correct matching under PBL transitions from one regime to another.
- The PBL model has been thoroughly tested and validated for a variety of studies, including maximum and minimum temperature and aviation forecasts.
- A new AMT model was developed using the KNMI AMT model and the Oregon State University 1D model, with changes made at Florida State University.
- Problems were encountered obtaining NOGAPS grids in real time so testing had to be done using the Nested Grid Model (NGM).
- Model performance was acceptable for many simulations for coastal Gulf of Mexico locations; however it was found that the model was "too moist" in many situations, necessitating better formulations for the marine atmospheric boundary layer in the 1D model.
- Marine PBL is (was) under investigation by Oregon State University and their results were not available to us while we conducted our investigation.

Therefore the "best" marine PBL may not have been used. Persistent clouds and vigorous mixing were systematic problems noted in the thesis by Birol Kara.

- AMT modeling still provides a useful standalone independent check on three-dimensional numerical models. With improvements in computing capabilities and four dimensional assimilation, it is anticipated that the present generation of mesoscale models will have superior performance. However, their large requirements for network connectivity and disk space may preclude their use in operational settings under certain conditions. Therefore we suggest that AMT modeling, which takes into account a moving vertical column model, is still worth some effort.
- Contractor delays were due in small part to the following circumstances out of our control: (1) delays in delivery of loaned equipment to contractor; (2) failure to deliver an extra X-terminal to contractor; (3) external computer break-in from a University student in New York State, which shut down our operation for over 4 months while University, FBI and DOD completed their investigation.